was therefore due to some secondary effect produced by the wind pressure, and not directly by the pressure itself, and it was to the ripples produced on the surface, which disturbed the wave motion, that the speedy breaking was to be attributed. It was, however, a direct result of the theory that the ripples depended on surface tension for their propagation, and could not exist in large amount on the oiled surface. It was also evident that the hold of the wind on the wave was greatly decreased by the absence of ripples, and thus the oil acted both to prevent the wind having much effect on the surface, and also to modify the motion of the water in the wave.

Prof. Stokes read a paper by Dr. Huggins *On Coronal Photography without an Eclipse.* In a paper read before the Royal Society some time back, Dr. Huggins had shown that it was possible by isolating, by means of properly chosen absorbing media, the light of the sun in the violet part of the spectrum to obtain photographs of the sun surrounded by an appearance distinctly coronal in its nature. These researches have been continued, using a reflecting telescope by the late Mr. Lassell, and a film of silver chloride as the sensitive plate on which the photograph is taken. These plates are sensitive to the violet light only, and therefore it was unnecessary to use absorbing media which had proved a source of difficulty to sift the light. Fifty photographs in all were taken and examined afterwards by Mr. Wesley, who made drawings of them for the paper.—Dr. Ball, who was in the chair, examined some of the plates, and spoke of the interest and importance of this communication.

Prof. Schuster read a paper *On the Internal Constitution of the Sun.* He had calculated the volume of the sun from its mass, assuming that it consisted of a gas subject to gaseous laws and in the state of convectional equilibrium discussed by Sir William Thomson. The paper showed that, if the rates of the specific heats of the gas were less than 1·2, the volume of the sun would be immensely larger than at present, while, if greater than 2·0, the sun's volume would be far smaller than it is. The result that the rates of the specific heats must lie between 1·2 and 2·0 is so far in agreement with received theories of the constitution of the sun.

Notes on some recent Astronomical Experiments at High Elevations on the Andes, by Ralph Copeland.—These experiments were made during the first half of the present year at the cost of the Earl of Crawford. At La Paz, in Bolivia, 12,000 feet, with the full moon in the sky, ten stars were seen in the Pleiades with the naked eye, and also two stars in the head of the Bull that are not in Argelander's *Uranometria Nova.* The rainy season lasted roughly until the end of March, after which there was a large proportion of fine sky. At Puno, on Lake Titicaca, 12,600 feet, with a 6-inch telescope mounted on a lathe headstock, a number of small planetary nebulæ, and some stars with very remarkable spectra, were found by sweeping the southern part of the Milky Way with a prism on Prof. Pickering's plan. The most remarkable stars had spectra reduced almost to two lines, one near D, and the other beyond F, with a wave-length of 467 mm., and apparently identical with a line in *some* only of the northern nebulæ as observed by Mr. Lohse and Mr. Copeland. A few close double-stars were also found, amongst them β Muscæ.

At Vincocaya, 14,360 feet, the solar spectrum was examined with a somewhat damaged instrument. The chief fact noted was the relative brightness of the violet end of the spectrum. With a small spectroscope several lines were seen beyond H and H_2. The prominences were visible with almost equal facility in C, D_3, F, and H_8. Attempts to see the corona proved futile, nor were the prominences seen otherwise than in the spectroscope, the only difference being that the slit could be opened far wider than down at the sea-level. A most careful examination of the zodiacal light failed to show even the slightest suspicion of a line in its spectrum, which was continuous although short. Both at Puno and Vincocaya the air was very dry the relative humidity there and at Arequipa, 7700 feet, being as low as 20 per cent. At Vincocaya the black bulb at one time stood above the local boiling point, while the wet bulb was coated with ice. The author was of opinion that an observatory might be maintained without discomfort up to 12,000 feet, or even a little higher—the night temperature falling only slightly below the freezing point. At greater elevations the thermometer falls 1° for every 150 feet of height, the barometer sinking about 0·1 inch for the same change. At 15,000 feet it will thus be seen that arduous winter conditions are reached without any very material gain in the transparency of the atmosphere. From information received it seems possible to maintain a station for a short time in the early summer as high as 18,500 feet; later on the rains set in and render travelling very difficult. Railway and steamboat communication enable instruments of any size and weight to be carried as high as 14,660 feet, and as far as the Titicaca shore of Bolivia.

OUR ASTRONOMICAL COLUMN

PONS' COMET.—The following ephemeris is deduced from MM. Schulhof and Bossert's provisionally corrected elements:—

At Greenwich Midnight

1883.	R.A. h. m. s.	Decl. ° ′	Log. distance from Earth.	Sun.
Oct. 16	16 39 53	+55 37·7	0·2653	0·2723
18	— 42 19	55 13·7		
20	— 44 57	54 50·0	0·2520	0·2600
22	— 47 47	54 26·5		
24	— 50 48	54 3·3	0·2378	0·2472
26	— 54 1	53 40·4		
28	16 57 27	53 17·7	0·2226	0·2340
30	17 1 5	52 55·3		
Nov. 1	— 4 56	52 33·1	0·2065	0·2204
3	— 9 0	52 11·2		
5	— 13 18	51 49·4	0·1894	0·2062
7	— 17 49	51 27·6		
9	— 22 37	51 5·9	0·1710	0·1916
11	— 27 40	50 44·1		
13	— 32 59	50 22·0	0·1513	0·1764
15	— 38 35	49 59·6		
17	— 44 29	49 36·8	0·1303	0·1607
19	— 50 42	49 13·4		
21	17 57 16	+48 49·1	0·1079	0·1445

The intensity of light will be three times greater on November 21 than on October 16, and will increase until near the middle of January. According to the experience of 1812, we might expect it to draw within naked-eye vision at the beginning of December, but it is not likely to attain a brightness at all comparable with the conspicuous comets of the last few years. It may rather be anticipated that when best seen, its light will be nearly that of stars of the third magnitude. We are of course assuming the comet not to have undergone material change since its last appearance. On the morning of August 18, 1812, the Paris astronomers have the note:—"La comète commence à être visible à l'œil nu; son noyau assez brillant, est enveloppé d'une chevulure et sa queue est d'environ 1½° à 2°." Employing MM. Schulhof and Bossert's final orbit, we find that at the hour of observation, about 2h. 30m. a.m. G.M.T., the comet was in R.A. 114° 24′, Decl. +40° 27′, distant from the earth 1·4713, and from the sun 0·9449, so that the intensity of light, expressed in the usual way, would be 0·52, which corresponds to that on December 1 in the present year. On the morning of September 14 it was remarked:—"La queue de la comète est divisée en deux branches parallèles; sa longueur paraît d'environ 3 degrès." At 4h. 30m. a.m. G.M.T. the comet was distant from the earth 1·2324, and from the sun 0·7778, whence, the earth's radius-vector being 1·0051, the angle at the comet was 54° 29′, and with Newcomb's solar parallax, the real length of the tail, if extending as most usual in the direction opposite to the sun, would be 7,600,000 miles, or a little over.

In announcing the discovery of this comet by Pons at Marseilles on July 20, 1812, Zach remarked (*Monatliche Correspondenz,* xxvi. 270) that it was the sixteenth (? fourteenth) comet which he had independently discovered within ten years. So indefatigable a worker in this direction well deserves that his name should be permanently associated with at least one of his discoveries, and none presents itself as affording a more fitting case than the comet of 1812.

SWIFT'S COMETARY OBJECT.—It would appear from unsuccessful search at European and American observatories that Mr. Swift must have been mistaken in supposing he had observed a comet in the places published in *Astron. Nach.*, No. 2541.

THE CORDOBA OBSERVATORY.—Dr. B. A. Gould, director of the Observatory at Cordoba, passed through London last week *en route* for South America, after attending the meeting of the "Astronomisches Gesellschaft" at Vienna, and that of the International Standard Commission at Paris. We learn from Dr. Gould that the printing of the second volume of Cordoba Zones is nearly completed in London. The attention of this

indefatigable astronomer will soon be directed to the publication of another great work undertaken by him at the Argentine National Observatory, viz. the Cordoba General Catalogue of Stars.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

OXFORD.—The commencement of the Michaelmas Term has been marked this year by an event of happy augury for the advancement of science in Oxford. Prof. Burdon-Sanderson opened the physiological department in the University Museum with an inaugural address, in which the aims and scope of physiology were defined with scientific accuracy and singular literary charm. The Professor showed the great importance of physiological methods for the advance of pathology, and ended by promising his future students something more interesting to study than "dry bones."

Prof. Sanderson gives a regular course of lectures on the "Mechanical Functions of the Animal Body," and the physiological laboratory is open for practical instruction under the Professor and two assistants.

Mr. Yule also has a class at Magdalen for Practical Physiology.

In the Department of Animal Morphology Prof. Moseley lectures on Comparative Anatomy, each lecture being followed by practical instruction. Mr. W. H. Jackson lectures on Mimicry and Parasitism; Mr. E. B. Poulton on the Fundamental Tissues, and Mr. W. L. Morgan on the Limbs of Vertebrata.

Mr. E. Chapman has a class at Magdalen for the study of Vegetable Histology.

In the Physical Department Prof. Clifton lectures on the Properties and Means of Measuring Electric Currents; practical instruction in Physics is given by Prof. Clifton and Messrs. Heaton and J. Walker. Mr. Heaton gives a course of lectures on Mechanics.

At Christ Church Mr. Baynes has a class for practical instruction in magnetic and electrical measurements. At Balliol Mr. Dixon gives an elementary course of lectures on Electricity and Magnetism.

In the Chemical Department Prof. Odling lectures on the "Naphthalene Family." Lectures on Inorganic and Organic Chemistry are given by Mr. Fisher and by Dr. Watts. Practical instruction is given by Mr. Fisher, Dr. Watts, and Mr. Baker. At Christ Church Mr. Vernon Harcourt forms a class for "Examples in Quantitative Analysis."

Prof. Prestwich lectures on the "Elements of Geology." Prof. Story-Maskelyne lectures on "Crystallography."

The Natural Science Scholarship at Exeter College has been awarded after examination to Mr. E. H. Cartwright, of Charterhouse School.

Natural Science Scholarships are offered for competition this term by Christ Church and Balliol Colleges.

CAMBRIDGE.—The outgoing Senior Proctor, Mr. Torry, in his address on laying down office, referred to the present system of granting M.A. degrees without examination, and suggested that all who had not already taken honours should be required to pass for M.A. in some specified portion of one of the honours examinations.

Prof. Darwin will lecture this term on gravitation, and consider some of the mathematical problems which arise in the theory of the figure of the earth, measurements of base lines and arcs of meridian, pendulum experiments, the Cavendish experiment, and cognate subjects.

The Demonstrator of Mechanism will take a class in rigid dynamics, with a view to its applications in engineering; and also a preparatory class in the differential calculus.

At the annual election to Fellowships at Trinity College, Mr. R. A. Herman, Senior Wrangler and First Smith's Prizeman in 1882, was elected a Fellow. Mr. W. R. Sorley was elected to the Fellowship given for mental and moral science.

The election to the Knightbridge Professorship of Moral Philosophy will take place on November 1. The electors are Professors Caird, Fowler, Hort, and Seeley, Drs. Campion and Todhunter, Mr. Leslie Stephen, Mr. Venn, and the Vice Chancellor.

Prof. Cayley lectures this term on higher algebra and the theory of numbers.

The Demonstrator of Comparative Anatomy is conducting an advanced class on the Protozoa and Cœlenterata.

Messrs. A. J. C. Allen (Peterhouse), and C. Graham (Caius), have been appointed moderators for the year beginning in May next.

Prof. Garnett, Dr. Vines, and Mr. Pattison Muir are appointed examiners for the first M.B. examinations; Prof. Miles Marshall, Dr. Gaskell, and Dr. Shuter for the second M.B. examinations of the current year.

Mr. Stearn is lecturing on electrostatics at King's College, with special reference to theories of electric displacement, specific inductive capacity, and the strain in a dielectric.

SCIENTIFIC SERIALS

Bulletins de la Société d'Anthropologie de Paris, tome 6, série 3, 1883.—In a discussion on polyandry in Cashmere and Thibet, M. Olivier Beauregard maintained that this practice prevailed among the early Aryan races of Hindostan 2000 years before the Christian era, as shown in the first book of the Mahâbhârata, from which he made several interesting extracts bearing on this point. His views were strongly contested by M. Ujfalvy.—"Remarks on the character of the crania of native South Australians," by M. Cauvin, who made a series of anthropometric determinations while engaged at Sydney in prosecuting his researches into the morphological characteristics of the Oceanic races.—M. de Ujfalvy, in a communication on the "Traces of the Ancient Cults of Central Asia," described the various superstitions which point to an earlier Vedic faith, and to a fire-worship among races who now adhere either to Hindooism, or Islamism, while in the heart of Central Asia the majority of the tribes are still followers of the "Old Man of the Mountains," or the belief of the "Assassins." He believes that the introduction of *Mazdeism* and Brahmanism was probably contemporaneous, and that these ancient cults were preceded by a form of Shamanism in which the products of nature were worshipped.—On human sacrifices among the Khonds of India, by M. E. Reclus. The author regards these so-called *mériahs* as a survival of an early practice of the ancient agricultural tribes of Asia, who believed that blood was necessary to the fertility and nutritive qualities of the fruits of the earth.—On the population of Western Laos, by M. Carl Bock. This memoir is remarkable for its minute ethnographic details and for the number of its anthropometric determinations, and treats of the political and social relations of the six Laotian States which pay tribute to Siam.—A discussion on the supposed practice of the "*Couvade* among the Basques," in which M. Vinson, who has been twelve years resident among the people, denies the existence among them of any such custom, and gives his reasons for doubting the assumed affinity of this people with the Iberians. M. E. Reclus thinks the existence of such a practice might perhaps be connected with the transition from the metronymic to the patronymic principle of family government; and that from an ethnological point of view the question of its reality, to which many of the best known classical authors have given their testimony, is worthy of attention.—On the prehistoric lasso, by M. Chauvet.—Report, by M. Nicaise, on the discovery of human bones, associated with Quaternary animal remains and worked flints, in the alluvial deposits of the Marne Valley near Chalons, with plan of locality, &c.—On the significance of the principal humeral of the biceps, by M. Leo Testut, with special reference to the contradictory opinions of Hyrtl and Calori.—Report on the brain of Louis Asseline, by MM. Duval Chudzinski and Hervé, with diagrams of various aspects of the hemispheres. M. Duval's assertion that Asseline's brain presented various simian characters drew forth M. Foley's strongly expressed reprobation, while M. Dally considers that the more general admission of a close anatomical affinity between man and the lower animals would be conducive towards morality, by lessening the cruelties wantonly inflicted on the latter.—Report of commission for the preservation of megalithic monuments, on the remains of dolmens of Port Blanc (Quiberon).—On a prehistoric case of dental abnormality, by Dr. Bernard.—Report on the adjudication of the Prix-Godard for 1883, by M. L. Rousselet, who passed in review the several labours of M. Chantre, to whom the prize has been awarded in consideration of the merits of his palæolithic atlas of France, and for his work on the Iron Age, while M. Prengrueber receives a silver medal, with honourable mention, for his anthropometric measurements of the Kabyles.—On dental erosions in the dog, by M. Capitan.—On the steatopyga of the Boshman women, by Dr. Blanchard.

Journal de Physique théorique et appliquée, September, 1883.—On the critical point of liquefiable gases, by J. Jamin.—On the compressibility and the liquefaction of gases, by J. Jamin.—